Variations of western Norwegian glaciers during the last 200 years	K. Faegri	Norway
Glacier variations and fluctuations of climate	G. Manley	Great Britain
The retreat of the Rhône Glacier	P. L. Mercanton	Switzerland
Recent glaciological research in Sweden	H. W. Ahlmann	Sweden
Glacial observations in the Canadian Cordillera *	V. Meek	Canada

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Progress of glaciological research in Great Britain	G. Seligman	Great Britain
Glaciological plans for the Norwegian-British-Swedish Expedition to Dronning Maud Land, Antarctica	H. W:son Ahlmann	Sweden

FILMS

Avalanche research film made by the Swiss Snow and Avalanche Research Commission (Schw. Schnee- und Lawinenforschungskommission).

The advance of the Grindelwald Glacier, made by A. de Quervain (Switzerland).

Formation of snow and ice crystals in the laboratory, made by U. Nakaya (Japan).

Production of ice crystals in a supercooled cloud in the laboratory, made by V. J. Schaefer (United States).

Snow harvest, made by R. A. Work (United States).

* Read *in absentia*.

REVIEW

GLACIOLOGICAL RESEARCH ON THE NORTH ATLANTIC COASTS. HANS W:SON AHLMANN. R.G.S. Research Series: No. 1. London: Royal Geographical Society, 1948, 83 pages. 7*s*. 6*d*.

IT may, perhaps, be regarded as a tribute to the growing importance of our science that the Royal Geographical Society should have decided to publish the results of Professor Ahlmann's researches as the first issue of its new *Research Series*. This handsome work embodies the fruits of at least twenty-two years' activity in the field on the part of Ahlmann and his colleagues. As he explains in the introductory chapter the work was not carried out according to any pre-arranged plan, but as circumstances directed. Thus a number of glaciers and snowfields of different climatic type have at various times been examined in those lands which encircle the North Atlantic. Each of the areas examined is described in the second chapter and its position shown on a map. These embrace the Horung *massif* (Horungtindene) in southern Norway, Kårsajökeln in Swedish Lapland, North-East Land (Nordaustlandet), West (Vest) Spitsbergen, Clavering Island (Clavering Ø) in north-east Greenland and Vatnajökull in Iceland. We learn in the third and fourth chapters how the processes of accumulation and ablation were determined in all these regions, and come to results of crucial importance in the fifth chapter. Thus a map on p. 46 shows the height of the glaciation level in hundreds of metres above sea-level in the countries around the North Atlantic. The values, which naturally decrease northward, and increase locally inland from the moister coasts, range from 22 in the interior of southern Norway to less than 1, that is to sea-level, in North-East Land (Nordaustlandet). It is interesting to note that, whereas in the highly maritime climate on the southern side of Vatnajökull the value sinks as low as 10, it rises to 14·5, on the northern side facing the central Icelandic desert, and that this latter value also appears over Ben Nevis—a relatively low figure for the latitude, evidently due to the cold summer and heavy winter precipitation. A figure as high as 14 along a strip of the Greenland coast is puzzling but apparently connected with

a topography unsuitable for the accumulation of snow as well as scanty precipitation. It is explained, although many readers will wish that this were done at greater length, that the "glaciation limit," depending as it does on topography, is usually rather higher than the "firn limit," and that although the latter corresponds more nearly with the climatic snow line it is difficult to measure directly. A graph on p. 48 showing the relation between summer temperature and accumulation at the glaciation limit is not linear but parabolic, indicating that a given increase of temperature has greater effect at a higher than at a lower temperature.

An important generalization concerning the regime of glaciers is given in the sixth chapter as follows: a glacier's balance sheet total equals the accumulation plus the ablation at the firn limit multiplied by the area of the glacier. If the glacier is in equilibrium the total ablation plus the accumulation should thus equal the amount of ablation and accumulation at the firn limit respectively multiplied by the area of the glacier.

Professor Ahlmann goes on in chapter seven to consider the rate of movement of glaciers and in chapter eight their classification from the morphological, dynamic and geophysical standpoints. He supports Penck's conclusion that glaciations are due rather to a lowering of temperature than to an increase of precipitation, although the latter must also play a part.

In the last chapter but one the author reviews the evidence which has led him to conclude that during the present century there has been a general recession of the glaciers in all the areas examined. The cause is assigned to increased ablation due to the greater vigour of the atmospheric circulation in the North Atlantic Ocean, whereby more heat is transported into the Arctic from lower latitudes. But he points out that since the sea-level has only risen slightly the great ice caps of Greenland and Antarctica, which together lock up 90 per cent. of all water stored on land in glaciers, cannot have been wasting at the same rate as the local glaciers investigated. It should, however, be noted that in the case of Greenland and especially in that of Antarctica, the matter is complicated by the fact that these ice caps are large enough to resist any climatic change for a long time by reason of their own cold. It does not seem that the warming up of the Arctic which Professor Ahlmann emphasizes has had much effect on the course of a number of very severe winters which Europe has more recently experienced. In the concluding chapter the need is stressed for further research in other parts of the world, especially in Antarctica. A table is appended which summarizes the more important facts relating to the following glaciers: Styggedal (Styggedalsbreen) in Norway, Fourteenth of July (Fjortende Julibreen) in Spitsbergen, Hoffell (Hoffellsjökull) in Iceland, Fröya (Fröya Gletscher) in Clavering Ø, East Greenland, and Kårsa (Kårsajökeln) in Swedish Lapland.

The reviewer as a climatologist is perplexed as to the exact meaning of the term "temporary snow-line" defined on p. 41 as the line (not, of course, an actual line as Professor Ahlmann observes) which a winter snow cover reaches at different times of the year, seen set in relation to the statement on p. 38 that on the southern side of Vatnajökull it does not descend below 250–350 m. above sea-level. It seems incredible that any part of Iceland should fail to receive at least several transitory snow covers in the course of a winter, when it is remembered that even the warmest part of the island is on a mean January sea-level isotherm scarcely above freezing point 32° F. (0° C.). A mean temperature as high as 40° F. (4·4° C.), or a little higher, is ordinarily low enough for intermittent or occasional snow cover. Perhaps conditions were very exceptional between 1935 and 1937 when Professor Ahlmann was there. If by the "temporary snow-line" we are to understand a more stabilized position of longer duration the difficulty is no doubt lessened.

Although climatological aspects of glacierization can be recognized as the keynote of this work, it contains much which deals with the geographical and physical aspects of glaciers. Moreover, coming as it does from one so eminent as Professor Ahlmann, it will, for this reason too, be welcomed by a very wide circle of scientists.

L. C. W. Bonacina